1037

# THE A-10 WARTHOG

## AMERICA'S MUDFIGHTER

Richard S. Drury


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## Front Cover

The most appropriate nose art seen in the Gulf was this Warthog representation, showing the aircraft was well named - and when in trouble 'Go Ugly Early'. (Tom Wakeford and Ian Rentoul)

## Back Cover

A formation of A-10s of the 172nd FS, Michigan ANG awaiting their turn to air refuel from a KC-135 of the 128th WI ANG. (MSG Jeff Rohloff/USAF)

# INTRODUCTION

Until "Operation Desert Storm," Fairchild's A-10 Thunderbolt II, perhaps better known as the "Warthog", was the arcana of military aviation. Designed as a low-altitude, slow-moving, "Tank Killer", and Close-Air-Support (CAS) aircraft, the A-10 was the venerable Douglas A-1 Skyraider updated with twin jet engines. The philosophy was essentially the same; low and slow, good loiter time, good load carrying capability and an endowment to take hits and keep going.

The AX program (Attack Experimental) of 1966 called for just those requirements. The concept was known as Close Air Support (CAS) and the program winner was the Fairchild A-10 which finally bested its competitor, the Northrop A-9. Although the Vietnam era war events gave birth to the A-10, the aircraft actually entered service years after the conflict terminated. It undoubtedly would have been a great warrior in that battle, particularly in the initial years when threats were less sophisticated.

The question that plagued the A-10 was whether or not it could survive in a modern war. That is, in an age of the Surface to Air Missile (SAM), handheld missile, radar guided anti-aircraft artillery (AAA) and fighters of incredible agility with state-of-the-art radar, could ANY low and slow aircraft survive?

As the prominent Russian threat appears to unravel, the European scenario becomes unlikely as does the use of A-10s in that nightmare theatre. Events in Iraq finally provided the A-10 with its first taste of combat but in a war that is difficult to categorize or derive meaningful conclusions about the future of warfare. With total air superiority gained almost immediately, the U.S. forces were able to employ the A-10 on highly productive tank-killing sorties, on Search-and-Rescue (SAR) missions, as a Forward Air Controller (FAC) and even in interesting air-to-air combat versus helicopters. The aircraft was kept out of the highest threat areas but still took a great deal of groundfire, took hits, and returned as advertised. In Operation Desert Storm, under the unusual theatre situation, the A-10 was a grand success. Indeed, time and events nearly passed by the A-10. Now, the question is, will future wars be akin to the adventure in Iraq or will they be fought in all arenas including air-to-air against enemy fighters and well operated AAA and SAMs? The A-10's future and its pilots' lives depend on the answer to that question.

Pursuing the optimistic track about the Warthog's future, the U.S. Air Force is upgrading the A-10 to extend its active service life. A major avionics program involves the Low Altitude Safety and Targeting Enhancement (LASTE). This upgrade includes a ground proximity warning system, a bombing system similar to that of the F-16 and an air-to-air feature for the GAU-8/A cannon. As the F-16 pilots have discovered, with LASTE and similar enhancements, when the "Death Dot" is on the target, the target vanishes. The question does remain as to whether the A-10 will be able to get through well-defended areas to make an attack.

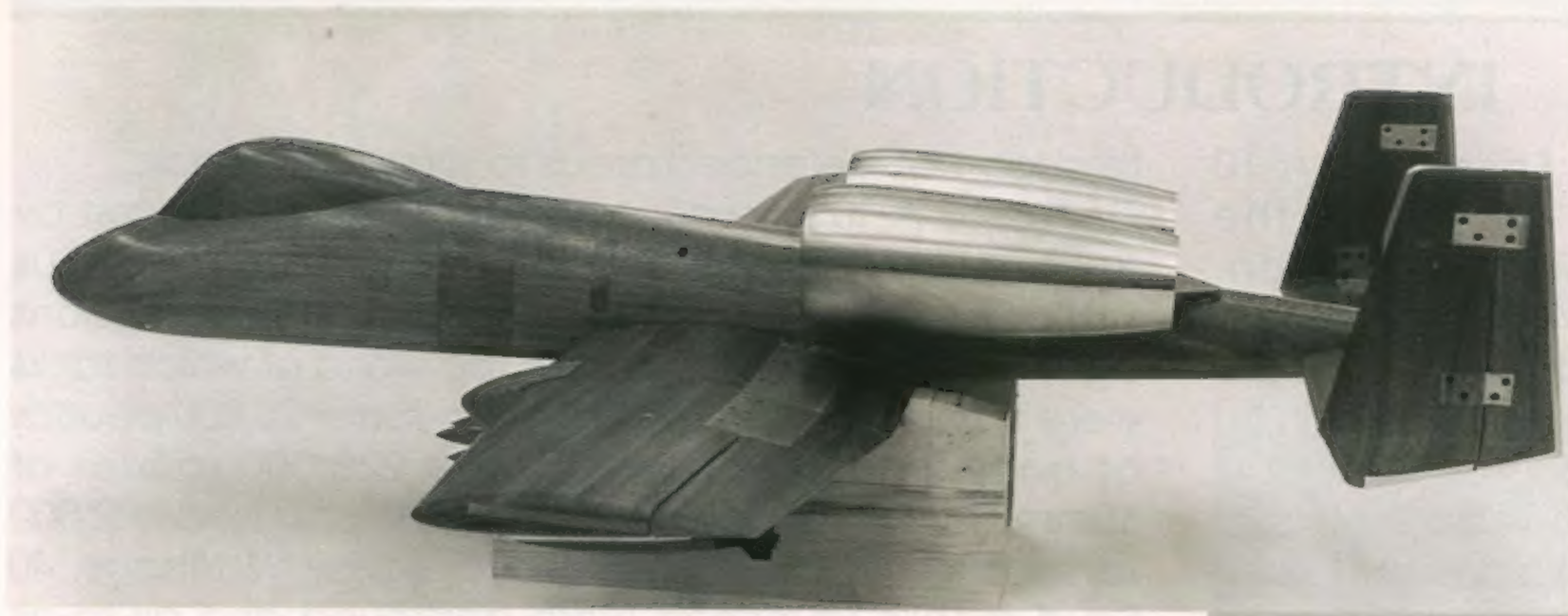
To the A-10's credit, over 90% of Iraqi tanks lost by the war's end were lost to A-10s. The 144 A-10s stationed in that theatre flew thousands of missions against the 4th largest army in the world of which tanks were a major part. A-10s dropped some 26,000 pounds of bombs and expended some 920,000 rounds of 30mm from Avenger armament systems. Nearly 2,000 tanks and vehicles were destroyed by Warthogs, 40 Scud mobile launchers were destroyed and air-to-air helicopter kills stand at two. These are impressive figures although they must be understood in terms of allied defense suppression and lack of fighter opposition.

"The A-10 with its new Low Altitude Safety and Targeting Enhancement (LASTE) system finally took most of the top honors at the 1991 Gunsmoke air-to-ground competition. The Top Team, Top Weapons Load and Top Gun competitions were ALL won by A-10 units." Certainly the A-10 can stand proud of its major accomplishments packed into such little combat and competitive time.

Pilots love flying the Warthog and for good reason - it is FUN. As Captain Jon Engle, a veteran of Operation Desert Storm puts it, "The A-10 is one of the last Air Force jets that you FLY! It takes aviators, not operators. The airplane's capability is a direct reflection of the pilot, not how tight the computers are on the jet. I love flying the A-10 because you FLY IT! You use the rudders, you feel the stall buffet when you max perform it, and, during the war, I knew it would get me home even if I took hits. She's old and slow but worth her weight in gold. It is as close as I can get to flying an A-1 Skyraider these days!" Enough said!

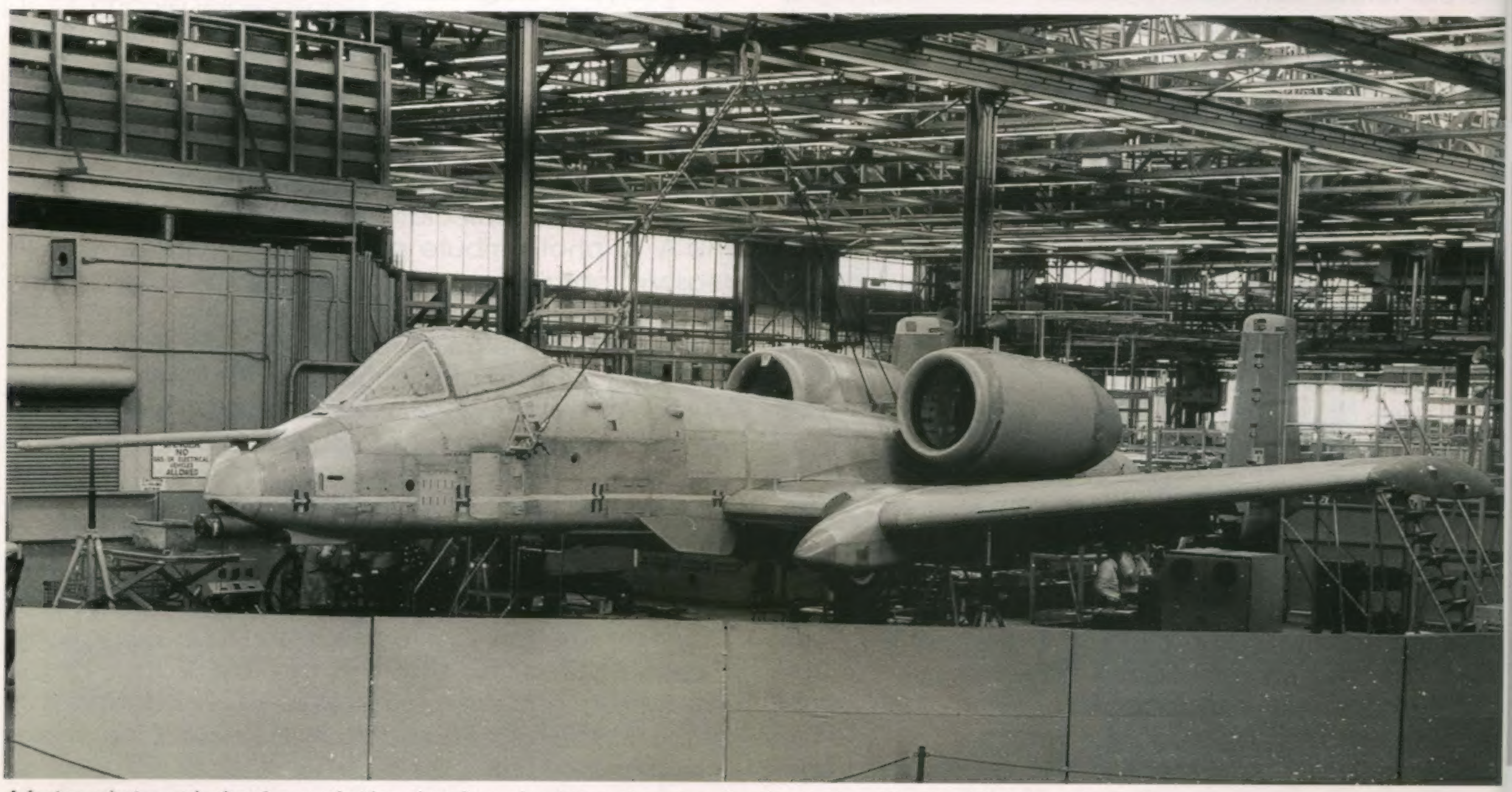
In a completely different role, the Unites States Forestry Service is considering modifying two A-10s to a tanker configuration to fight forest fires. External tanks are to be mounted on the aircraft centerline, capable of carrying up to 1,800 gallons of fire retardent. There may well be life in the Warthog after its military career.

My sincere appreciation goes to those who made this A-10 photo tribute possible. For various obscure reasons, obtaining A-10 photos and information was onerous. So my special thanks to the few who came through when the going really got tough. In particular, A-10 pilot, Captain Jon Engle. Also Mr. Blake Morrison of the Air Force Fighter Weapons School, Nellis AFB, Nevada, Captain Landis Cook, Mr. Joshua Stoff of the Cradle of Aviation Museum in New York, Mr. Tom Howard, Sgt. Andy Stanton, Mr. Mike Machat, Mr. John Wegg, Mr Joe Cupido, the 343rd WG/PA at Eielson AFB, Alaska, and Capt. Craig Laurie, USMC, for his production assistance. My appreciation also goes to Colonel Noel Hanna, 110th Fighter Group/DCO, Battle Creek ANG for his effort in the last stages of this production. And sincere thanks to LTC Phil Hofmann Jr. of the 174th TFW for his dedication to obtaining photos in such a short time.



Shown in an old and previously "confidential" company photo, is a wood mock-up of the Fairchild concept for the AX competition. The A-10 was born. (Cradle of Aviation Museum)

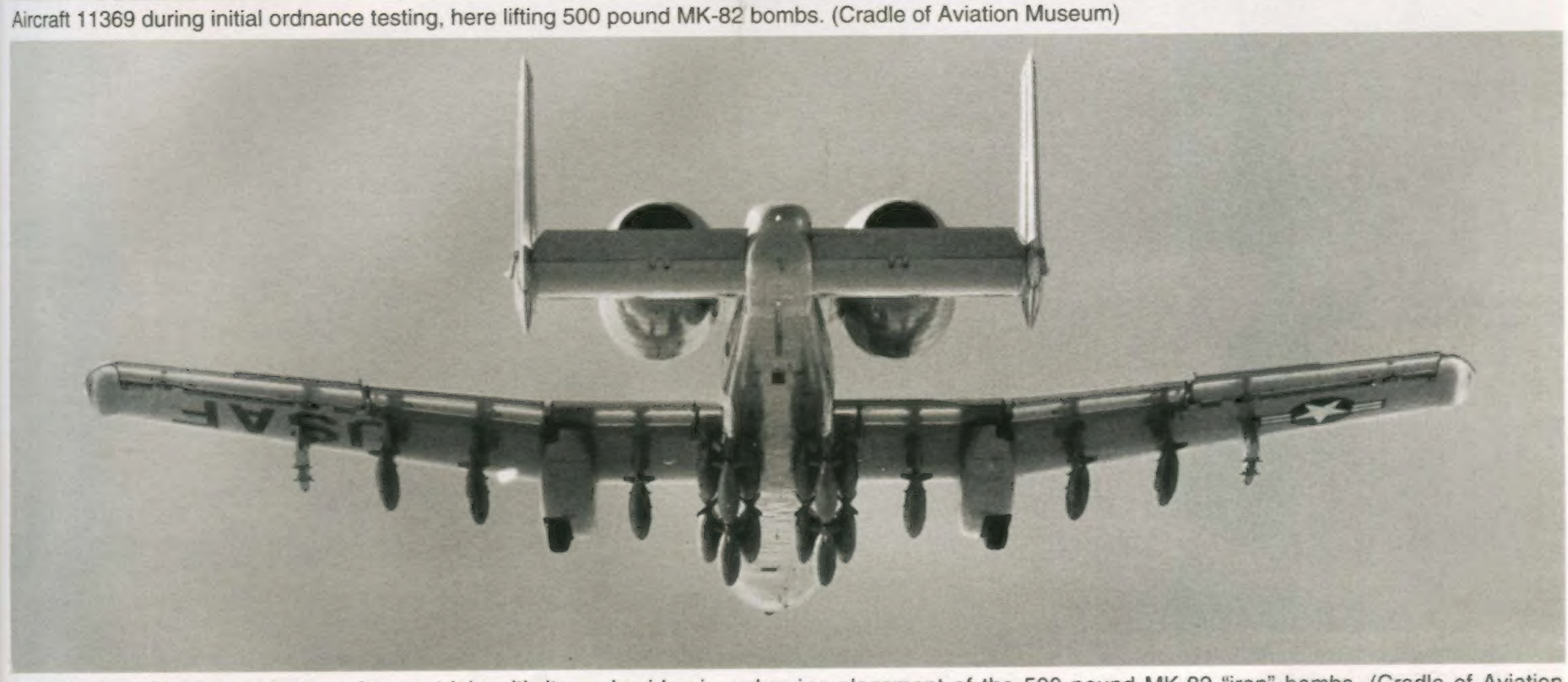
Offset nose gear is clearly shown on this YA-10 prototype aircraft. The GAU-8/A "Avenger" cannon was also initially fitted. The prototypes did not have the built-in steps for cockpit access. (Cradle of Aviation Museum)



A factory photograph showing production aircraft number two undergoing vibration testing. (Cradle of Aviation Museum)


Aircraft number 11369 was the first YA-10 shown here in its basic overall grey finish. It was first airborne on May 10, 1972. (Cradle of Aviation Museum)


Aircraft 11369 during initial ordnance testing, here lifting 500 pound MK-82 bombs. (Cradle of Aviation Museum)



The first YA-10 enroute to ordnance trials with its underside view showing placement of the 500 pound MK-82 "iron" bombs. (Cradle of Aviation Museum)


Aircraft number 11370 was the second YA-10 prototype. Both prototypes and the A-10 pre-production aircraft were fitted with the long nose probes. (Cradle of Aviation Museum)


The first pre-production A-10, number 73-1664, was modified to a two-seat Night Adverse Weather (N/AW) version over a 13 month period. It first flew on 4 May 1979. It is seen here at Edwards Air Force Base, California, in September of 1981 on its overall Gunship Gray (FS 36118) paint scheme. (Tom Howard)

Also known in the United States Air Force registry as the YA-10B, the N/AW-10 carried a second, raised cockpit and an additional twenty inches to the vertical stabilizers for added lateral stability due to a destabilizing effect caused by the aft cockpit and deeper front fuselage. Here the aircraft shows a faded, worn appearance at Edwards AFB in October of 1988. (Tom Howard)

A nose, side view clearly shows the elevated rear cockpit of the N/AW-10, designed to provide good forward visibility, the back-seater gaining nearly one foot higher eye level over the front seat. (Tom Howard)

The Air Force elected not to buy either the two-seater N/AW-10 or a training version, opting for the single-seater configuration. The N/AW-10 never went into production and the prototype languishes at Edwards AFB in California. (J. Cupido)

Atop the N/AW-10's rear panel is the Forward-Looking-Infra-Red (FLIR) display unit. Also noticeable are the side-hinged canopy sections and overa excellent visibility. ACES II ejection seats are installed. (USAF)

The enlarged vertical tail area is evident in this aerial photo. The fron cockpit's titanium tub was no extended to the rear. There was ver little performance degradation ir comparison to the single-seat A-10 (USAF)

A quartering rear view of the N/AW-10 showing the Texas Instruments AAR-42 Forward-Looking-Infra-Red (FLIR) mounted on the aircraft's belly centerline. The Pave Penny laser search and tracking pod is mounted on a pylon below the front cockpit. (USAF)

This starboard front view illustrates the immense canopy sections and the hinged configuration that was eventually scrapped in favor of the rear hinged canopy on the production airframes. (USAF)

This Nellis AFB based A-10 is down "in the dirt" doing what it was designed to do: low-level, close-air-support. This particular A-10 wears one of the three spotted designs tested during the Joint Attack Weapons Systems (JAWS) tests at Fort Hunter-Liggett in California. This paint scheme was tried after Air Force personnel viewed some photos of WWII German Bf-109s in similar mottle over the desert. The A-10 proved hard to see down low, in the trees. While effective in the venue, it was less effective at higher altitudes and the Air Force opted not to use it on production aircraft. (Blake Morrison)

This Joint Attack Weapons System (JAWS) photo clearly shows the effect of camouflage at low-level. Down low, the A-10 is hard to see and typically blends in with the foliage. (Cradle of Aviation Museum)

The Joint Attack Weapons System (JAWS) exercise was a joint Army and Air Force event that provided the A-10 with extensive low-level testing in the attack/close-air-support (CAS) roles. Such missions are generally flown at extremely low levels where terrain avoidance is a major pilot activity. (Cradle of Aviation Museum)

A formation photo of two A-10s from the 354th TFW at Myrtle Beach, South Carolina. These aircraft have been painted an early paint scheme know as MASK-10A pattern. The special gray colors were known as Reflectance Gray and were expressed in percentages, the two colors of the MASK-10 scheme being 30°₀ and 50°₀ Reflectance Gray, meaning it reflects 30°₀ and 50°₀ of incident light respectively. (Cradle of Aviation Museum)

Caught just before landing, this A-10 from the 81st TFW, RAF Bentwaters, England (USAFE) wears the MASK-10A paint scheme. (Cradle of Aviat Museum)

An aerial refueler's view of an early A-10 with refueling probe attached. Note the mottled, worn grays of the paint scheme. (Cradle of Aviation Museum)

An 81st TFW A-10 at Davis-Monthan AFB in 1979. The aircraft wears the two-tone gray paint scheme with a false canopy along the bottom forward surface. (P. Lewis)

A-10 73-1668 in a mottled gray finish of 40%, 50% and 60% Reflectance Gray during evaluation in 1976. (P. Lewis)


A-10 73-1669 following paint evaluation at Edwards AFB, California. Its three tone gray finish is highly weathered. The outer and inner rudder surfaces as well as wingtips are international orange. (J. Wegg)

An excellent overhead photo of aircraft 73-1668 with its well-worn three-tone gray evaluation paint scheme. Note the extended decelerons or airbrakes. The ailerons split open for this feature. (B. Morrison)

An excellent overhead view of aircraft 75-0260 with a fresh paint scheme of overall "Light Compass Ghost Gray", FS 36375. (B. Morrison)

Down in the trees, an overall gray A-10 works a tactical range in California. (B. Morrison)

A 354th TFW A-10 at liftoff. This Warthog wears the MASK-10A gray paint scheme and carries the large 600-gallon external fuel tanks used by the F-111. (J. Cupido)

Three A-10s follow a Lockheed C-130 support aircraft on a cross-country flight. The A-10s all carry the large, long range ferry tanks. (Cradle of Aviation Museum)

A comparative view of two very different paint schemes. The lower A-10 wears the MASK-10A gray with a false canopy painted under the nose. The top aircraft sports the "lizard" paint scheme, or "Euro-1" common to the current crop of A-10s. (Cradle of Aviation Museum)

These A-10s are about to start a training sortie and carry blue "practice" bombs. The pilot in the foreground has placed his aircraft checklist to the side of the instrument panel and already wears his oxygen mask which also contains his microphone for communications. (USAF)

An A-10 launchers a Sidewinder missile over a test range. While the A-10 essentially has no real air-to-air capability for self-defense, it is hoped that the Sidewinder will offer some chance in that arena. They could certainly be effective in the event a fighter slows to engage or overshoots during an attack (Cradle of Aviation Museum)

On its side, this A-10 displays its underwing pylon layout as well as fuselage pylons. The aircraft's ability to carry a large ordnance load is due basically to an old-fashioned airfoil section, a NACA 6716, which offers optimum high-lift features at low speeds. It also allows for a smaller wing area than more modern, faster wings. (Cradle of Aviation Museum)

This A-10 undergoes a right engine change as two A-10s pass by overhead. This aircraft design does not require large equipment and cranes to change engines, a positive feature in combat conditions. In this case, a portable winch sits on top of the nacelle requiring minimum manpower to perform the work. (USAF)

A four-ship formation of A-10s pose below a tanker before refueling. Noteworthy are the huge engine nacelles and landing gear pod fairings. (USAF)

A 354th TFW A-10 at a Red Flag exercise having its GAU-8/A Avenger gun "serviced" with the Hydra Ammunition Loading System (ALS). Note also the installed Pave Penny laser search and tracking pod (also known as the TISL for Target Identification Set, Laser System) which is mounted on the long fuselage side pylon. (Cradle of Aviation Museum)

While the A-10 certainly has an unusual and ungainly shape, the result is a matter of carefully selected elements employed for their effectiveness in the business of war. Namely, non-handed interchangeable parts such as the built-up engines, vertical fins, elevators, inboard flaps, pylons, nacelle inlets and aft engine sections as well as main landing gear. The aircraft can fly with parts shot away and can take hits and survive, a major requirement for the low-level Warthog. (Cradle of Aviation Museum)

Edwards AFB, California..... An air-to-air left side view of an A-10 Thunderbolt II aircraft firing a three second burst from its nose-mounted General Electric GAU-8/A Avenger 30mm seven-barrel cannon. The A-10 is over Range P-8. (USAF)

Nellis Air Force Base, Nevada. A right front view of A-10 Thunderbolt II aircraft on the flight line during Gunsmoke '81. (USAF)

Kotzebue Air Station, Alaska.....An air-to-air view of a camouflaged A-10 Thunderbolt II aircraft, participating in Exercise Cool Snow Hog '82-1. (USAF)

RAF Bentwaters, England.....3/4 right front view of an A-10 with three practice bombs mated on a multiple ejection rack on each wing, on the ground. (USAF)

Pilots and aircraft ready for takeoff at Nellis AFB, Nevada. Both are armed with white Maverick missiles. (P. Lewis)

A-10 78-0669 of the 355th TFW at Davis-Monthan AFB, Arizona with bright yellow markings. On wing station one is an AN/ALQ-119 (V) ECM pod designed to provide protection from enemy radar. (USAF)

A dramatic photo of an A-10 pulling wingtip contrails during high-G maneuvers. (B. Morrison)

Its "remove before flight" flags and covers in place, this 81st TFW A-10 from RAF Bentwaters, England, proudly displays its Wing badge on the fuselage side. (B. Morrison)

A-10 77-0249 from the 930th TFG at Grissom AFB, an Air Force Reserve A-10 unit. (USAF)

MSgt Patrick Nugent, photojournalist, assigned to the 1352nd Audiovisual Sq., Norton AFB, California reinlists at 10,000 feet over Nevada with (L-R) an F-16, A-10 and F-15 from the 422nd Test and Evaluation Sq., Nellis AFB, Nevada, flying high overhead. (MSgt Nugent)

An interesting 3-ship formation photo showing the vastly different design philosophies between pure fighters, and the A-10 Warthog. All aircraft wear the WA tail codes meaning they are from Nellis AFB, Nevada. Bottom to top they are the F-16 Fighting Falcon, the F-15 Eagle and the A-10 Thunderbolt II better known as the Warthog. (USAF)

Air-to-air front view of two A-10 Thunderbolt II aircraft of the 18th Tactical Fighter Wing, Eielson Air Force Base, Alaska, flying in trail formation. (USAF)

An A-10 engulfed by gasses from firing its GAU-8/A 30mm cannon. (B. Morrison)

A-10s on the Nellis AFB ramp. Note F-111s in the background (B. Morrison)

A 23rd TFW A-10 caught just at the moment of rotation on takeoff. (B. Morrison)


An OA-10 from the 5th TACG, Suwon AFB, Korea, part of the PACAF fleet. (B. Morrison)

Decelerons extended, an A-10 on landing rollout at Nellis AFB, Nevada with the buildings of nearby Las Vegas in the background. (B. Morrison)

Two 23rd TFW A-10s launch from Nellis AFB on a tactical exercise. (B Morrison)


Aircraft 79-096 from the 353rd TFS at Myrtle Beach AFB, South Carolina displaying bright red-orange tail markings. (USAF)

A fine overhead photo of an A-10 from the 104th TFG, Barnes MAP, Mass., an Air National Guard A-10 unit. (J. Cupido)

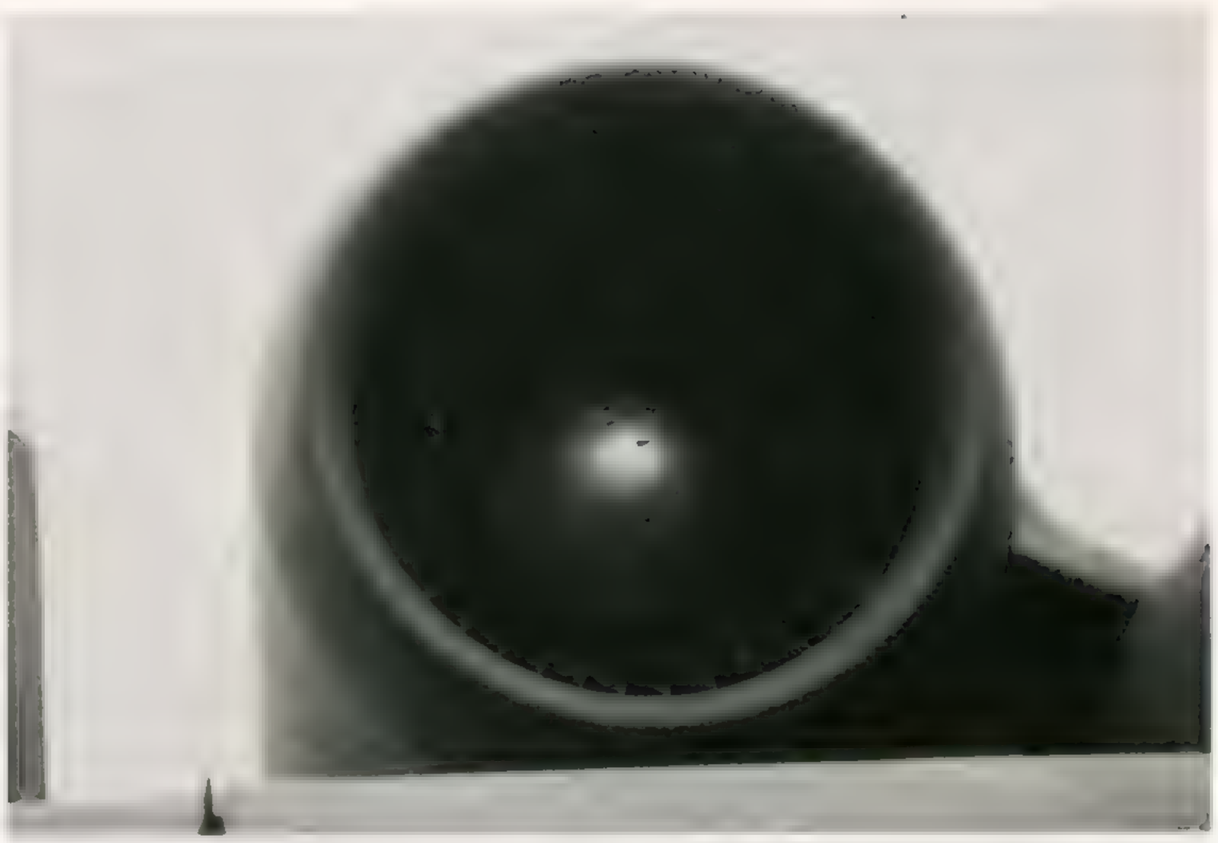
This close-up starboard nose photo shows bright panel screws indicating frequent removal. The A-10 pilot sits within a fortress of titanium, the walls of this protective shell vary from 0.5 inch to 1.5 inches and the entire "bathtub" weights some 1,200 pounds. (J. Cupido)

Crew chiefs stand by their Warthog. This aircraft's GAU-8/A muzzle has been fitted with a gun diverter designed to keep the great amount of sm
away from the canopy and engines when the gun is fired. (B. Morrison)

Twelve A-10s from the 354th T
just about in formation on an overh
pass, a rather unusual sight.
Morrison)

Warthog number 538 from the 354th TFW just a second prior to touchdown. (USAF)

An extreme close-up of the huge nacelle housing the A-10's TF-34 engine. The fan blades are clearly visible. Engines on the A-10 can be placed on either side since they are interchangeable. (Tom Howard)

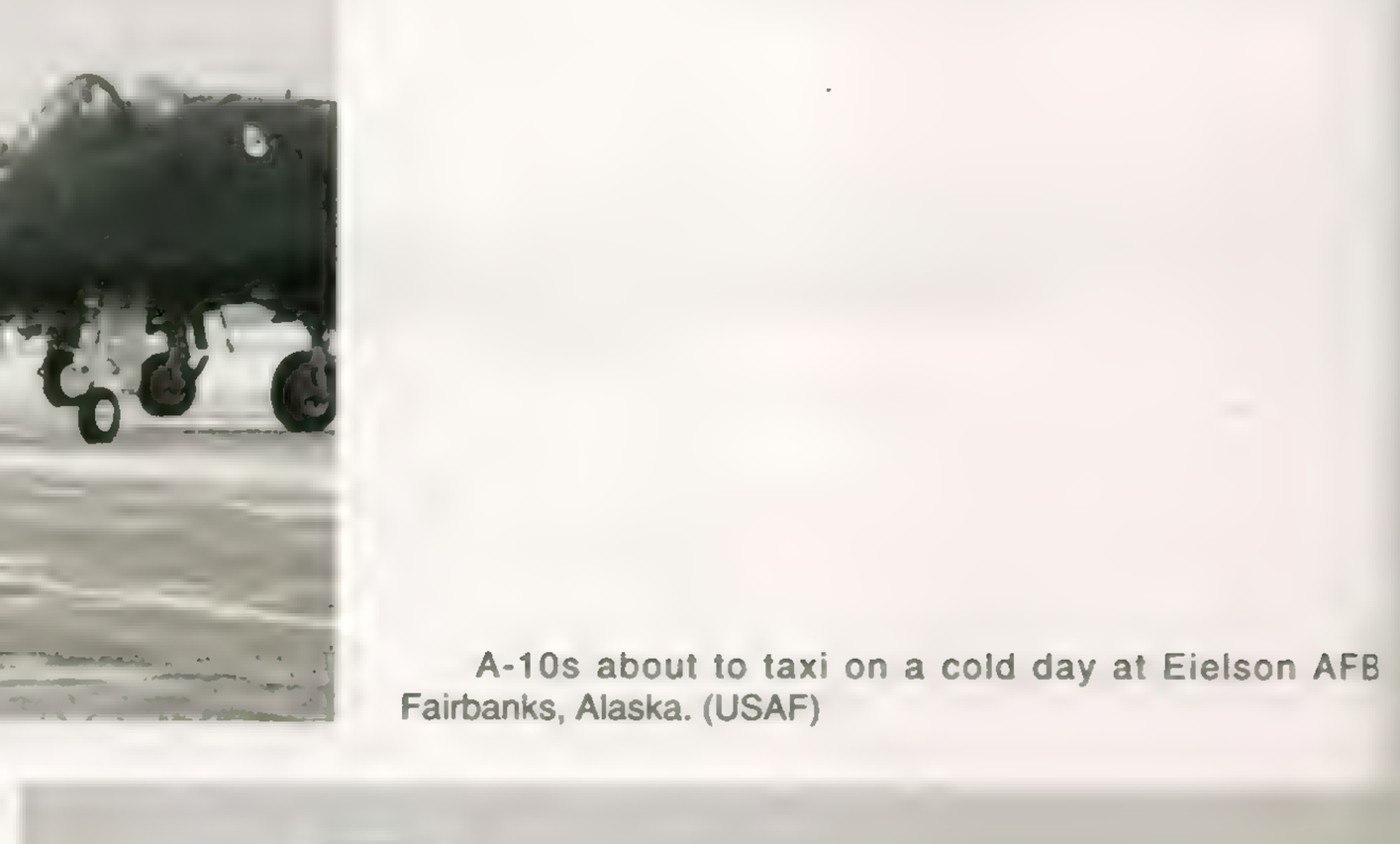


A takeoff photo shortly after liftoff. The gear is still retracting. Note the forward retraction configuration of the nose gear. This aircraft carries a Maverick air-to-ground missile. (J. Cupido)

A 57th FWW A-10 descending for an ordnance pass on a tactical range in Nevada. (USAF)

An Alaskan Air Command (AAC) A-10 of the 343rd TFW with striking engine inlet covers in place. (B. Morrison)

A-10s about to taxi on a cold day at Eielson AFB Fairbanks, Alaska. (USAF)




Eielson AFB A-10s taxi out for a training mission. Assigned to the 18th Tactical Fighter Squadron, these pilots and aircraft endure the hardships of extreme cold weather operations. (USAF)

Lt Colonel Phil Hofmann, Jr. leads a 2-ship A-10 174th TFW flight by spectacular Mt. McKinley in Alaska. Both aircraft carry the Pave Penny laser search and tracking pod. (USAF)

The 174th TFW deployed to Alaska due to the excellent, large tactical ranges available. The Alaskan practice ranges provide realistic targets, threat simulations and laser target designators. (USAF)

The A-10's 30mm cannon muzzled snout is profiled against an Alaskan summer night's sky when it is light 24 hours a day. This 174th TFW A-10 also carries a Pave Penny laser search and tracking pod. (USAF)

Eight A-10s on the Eielson AFB, Alaska ramp during Alaskan summer operations in 1985. (USAF)

A 174th TFW A-10 launches a AGM-65 Maverick over the Gila Bend Arizona, tactical range - now renamed the Goldwater Range. (MSgt John Luszcz)

Two A-10s over the Arizona desert enroute to a tactical range. Both aircraft carry AGM-65 Mavericks. (MSgt John Luszcz)

A unique, close-up photo of an A-10 about to refuel from a KC-135 tanker. Note the air-refueling receptacle door open, a function of pulling a cockpit lever to mechanically open the door. Also clearly in view is the glass top of the head-up-display (HUD). (MSgt John Luszcz)

An A-10 being air-refueled from a KC-135 tanker as others fly loose formation and await their turns. (MSgt John Luszcz)

An A-10 takes on fuel from a KC-135. (MSgt John Luszcz)


An open ladder access door reveals a typical piece of A-10 artwork, the A-10 being nicknamed the Hog. Also notice the Outstanding Unit citation on the same panel. (USAF)


The 174th TFW's unique A-10 patch aptly portrays the airplane's personality with comic relief. (MSgt John Luszcz)

A-10 winter operations at Syracuse, New York. This groundcrew wears the chemical warfare training equipment ensemble, onerous but certainly essential should chemical warfare take place. Fortunately, such was not the case in Iraq. (MSgt John Luszcz)


An A-10 on its taxi route just beyond one of Lechfeld's airbase sign denoting a "No Entry, Hazardous Noise" area. Lechfeld is situated about 3 miles west of Munich, Germany. (USAF)

A 174th TFW A-10 over the Thousand Islands area of the St. Lawrence River. This airplane wears the markings indicative of actual participation in NATO exercises in Germany - hence the Bavaria name. (MSgt John Luszcz)

This climbing A-10 carries an AGM-65 Maverick air-to-ground missile enroute to a tactical practice range. (MSgt John Luszcz)

A 174th TFW A-10 over upstate New York. Note the blending of its flat camouflage with ground foliage. (MSgt John Luszcz)

An A-10 from the Syracuse, New York, Air National Guard moving slowly across slippery winter taxiways. (MSgt John Luszcz)


Most A-10 cockpit access ladder doors have some sort of "painting" inside. This A-1
from the 81st TFW from RAF Bentwaters, England, proudly displays its Gunsmoke 198
badge. (B. Morrison)

On final landing approach, this A-10 reveals its rather ungainly architecture. On the right wing station is an ALQ-131 ECM pod and under the left wing can be seen a Maverick missile. A Pave Penny laser pod is also attached. (J. Cupido)

Aircraft number 31664 was the first pre-production airframe, shown here in its all gray paint scheme "Gunship Gray", FS 36118. The white numeral one n the vertical tail designates this airplane as the first A-10 from the production line at Fairchild. This photo also shows the airplane with the long range ferry nks under the fuselage just before the airframe was modified to the N/AW-10 two-seat configuration. (Cradle of Aviation Museum)

A-10 75-0264 from the 355th TFW, Davis-Monthan AFB, Arizona, in an early paint scheme known as MASK-10A pattern. (B. Morrison)

A closeup shot of a gray A-10's nose area. The pilot has excellent visibility due to a cockpit design offering a 20 degrees down over the nose, 40 degrees over the sides and 360 degrees all around from a clear, bubble canopy. (J. Cupido)

An A-10 from Nellis AFB, Nevada refuels from an Air Force KC-10 (USAF)

Kotzebue Air Station, AK..... A ground crewman performs maintenance on an A-10 Thunderbolt II aircraft during Exercise Cool Snow Hog `82-1. (USAF)

RAF Bentwaters, England.... A air-to-air left side view of an A-1 Thunderbolt II aircraft. The aircra from the 81st Tactical Fighter Wing. carrying four AGM-65B Maveric Scene Magnification missiles and a AN/ALQ electronic countermeasure pod. (USAF)

A right side view with the A-10's distinctive drooping wingtip in the foreground, an aerodynamic device used to generate lift at low speeds as well as improve aileron efficiency. (J. Cupido)

A fine overhead photo of a 355th TFW A-10 from Davis-Monthan AFB, Arizona. Its "European 1" camouflage is somewhat worn as the colors are chipped and faded. "Euro 1" is a three-tone camouflage of FS 34102, Light Green, FS 34092, Dark Green, and FS 36081, Dark Gray. (J. Cupido)

Two A-10s from the 57th FWW, Nellis AFB, Nevada, in landing formation. (J. Cupido)

Lt. Colonel Phil Hofmann, Jr. leads a 2-ship A-10 174th TFW flight by spectacular Mt. McKinley in Alaska. Both aircraft carry the Pave Penny laser search and tracking pod. (USAF)

Two A-10s fly overhead th USAF photographer in a Lockheed T- 33 trainer out of Elmendorf AF Alaska. (USAF)

A 174th TFW A-10 at Lechfeld, Germany, during Operation Reforger NATO exercises in 1987. This aircraft carries two 600 gallon external fuel tanks on its inboard pylons. (USAF)

Loading the GAU-8/A by means of the General Electric Hydra 1 automatic ammunition loading system (ALS). This system also removes empty cartridges. (J. Cupido)

The offset nose gear and centerline cannon are well illustrated here The lines atop the nose are guidance markings for inflight refueling and the slipway door is just above. (J. Cupido)

A dramatic shot of a 23rd TFW A-10. The huge engine et area is evident. The offset nose gear placement and nter cannon location is clearly shown. (B. Morrison)

Nevada..... An air-to-air left side view of an A-10 Thunderbolt II aircraft armed with AIM-9 Sidewinder missiles. The aircraft, from the 422nd Test and Evaluation Squadron, is in flight over the Nevada desert. (USAF)


An air-to-air left underside view of an OA-10 Thunderbolt II aircraft of the 23rd Tactical Air Support Squadron in flight over the desert Southwest. The 23d TASS is the first squadron to convert from the OA-37 Dragonfly observation/attack aircraft to the OA-10. (USAF)

An A-10 of the Syracuse, New York, Air National Guard in formation with an A-7D from the Selfridge Air National Guard unit in April of 1988. (R. Drury)

A 23rd TFW A-10 "Flying Tigers" with gear and flaps extended for landing. Note the generous flap area and drooped wingtip providing excellent low-speed performance. (USAF)

The A-10's cockpit is not state-of-the-art "glass" but it is "user friendly", allowing its pilot the ability to spend his time 'outside' the cockpit. Note the heads-up-display (HUD) atop the panel with a "G" meter on the left and a simple "standby" compass on the right. (R. Drury)

A Baltimore, Maryland 175th TFG pilot walks past a CBU- mounted on the left wing. He carries his helmet bag and so wears his helmet indicating minimum time before engine art and taxi. (R. Drury)

These 23rd TASS A-10s from Davis-Monthan AFB, Arizona, are actually being used in the Forward Air Controller (FAC) role and are now known as OA-10s. There is essentially no difference between an OA-10 and the A-10, just the manner of employment. As a FAC, the A-10 offers more speed, better armor and survivability, and versatility than former FAC aircraft such as the OV-10. (USAF)

Mean machine that means busi- ess. A 23rd TFW A-10 with shark- mouth giving the impression 'Go on, make my day'. (Tom Wakeford and Ian Rentoul)

The most appropriate nose art seen in the Gulf was this Warthog representation, showing the aircraft was well named and when in trouble. 'Go Ugly Early'. (Tom Wakeford and Ian Rentoul)

In 1992, aircraft from the 81st TFW, RAF Bentwaters England made up part of the 7440th Combat Wing )(Provisional) at Incirlik AB Turkey. Here, one of those aircraft prepares to line up to take off for mission in support of Operation Provide Comfort, the aerial umbrella flown for the Kurdish population against the Iraqi military follwing the Gulf War. (Tom Wakeford and Ian Rentoul)

The 110th FG/172nd FS currently operates 22 A-10s with more to come. (MSG Jeff Rohloff/USAF)

A-10s of the Battle Creek, Michigan ANG unit, the 172nd FS. This unit transitioned from the A-37 to the A-10 in May of 1991. (MSG Jeff Rohloff/USAF)

An A-10, from the 81st Tactical Fighter Squadron at RAF Bentwaters, UK, receives fuel from a KC-135, from the 305 refueling wing at Grissom AFB during Operation Provide Comfort. (USAF)

An A-10 pulls off a gunnery pass while dirt is still in the air around the strafe target panels. (B. Morrison)

Spain..... An air-to-air right side view of 91st Tactical Fighter Squadron A-10 Thunderbolt II aircraft. The aircraft are taking part in a training mission over northern Spain while on deployment to Zaragoza Air Base. (USAF)

Spain.... An air-to-air right side view of a 91st Tactical Fighter Squadron A-10 Thunderbolt II aircraft firing its 30mm cannon on a target at the Barderas Reales bombing range during a training mission while the squadron is deployed to Zaragoza Air Base. The nose art on this particular aircraft signifies that it belongs to the squadron commander and represents an example of the Air Force's attempt to reinstate this distinctive tradition. (USAF)

An A-10 from Davis-Monthan AFB, Arizona, swoops in for a bomb run at the Ghila Bend Bombing Range. (TSgt Bob Simons)

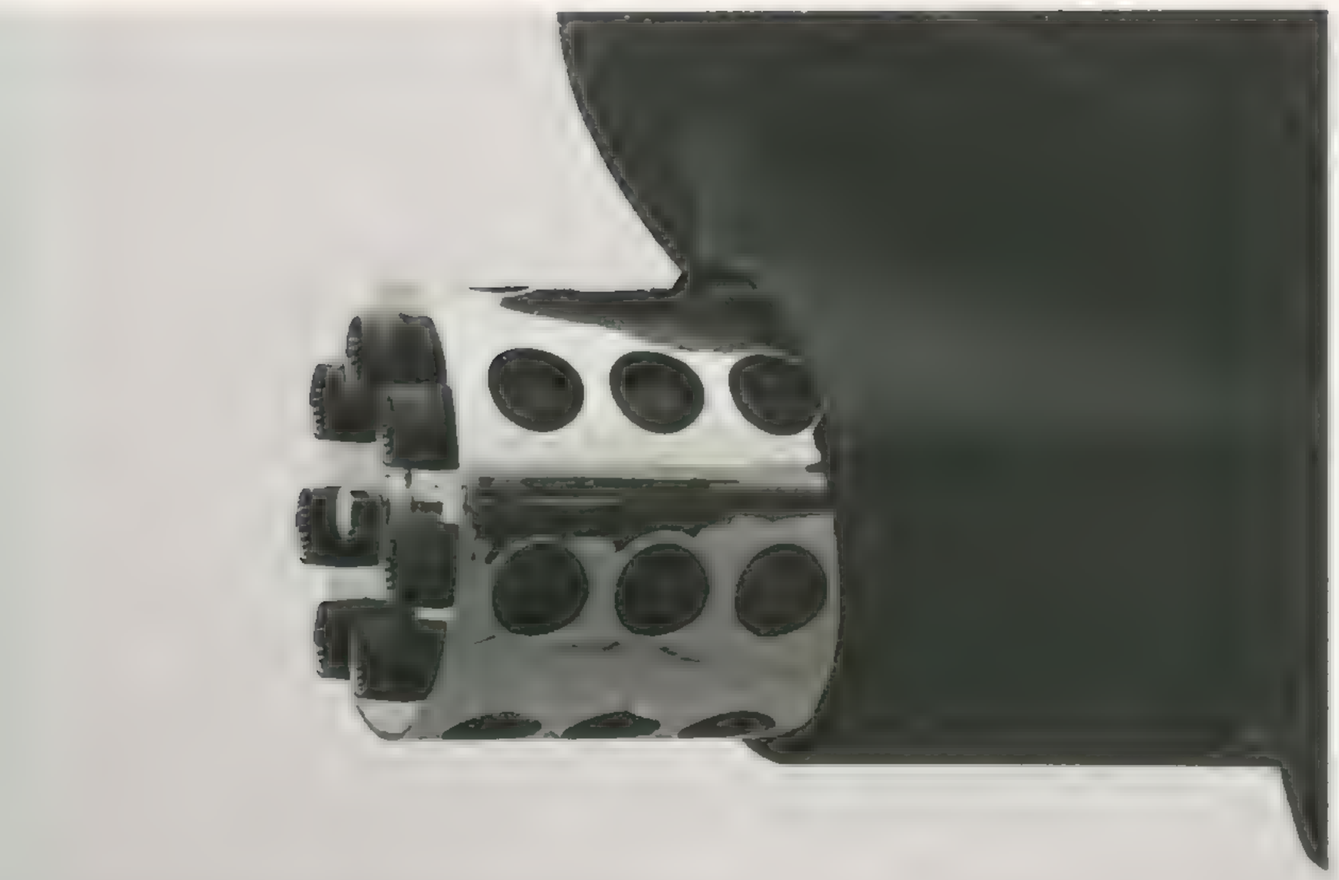
The famed Flying Tigers, the American Volunteer Group (AVG) is the predecessor of the 23rd Fighter Group which was formed on 4 July 1942 as part of the China Air Task Force. Today's 23rd TFW A-10s sport the famous nose art once seen on P-40s. (USAF)

The "business end" of a 23rd TFW "Flying Tigers" A-10. Observe the wear on the air refueling door from the rigid aerial refueling probe. This panel is left unpainted for this reason. (USAF)

This 23rd TFW Sharkmouth A-10 reveals the "bugeye" radar warning receiver antenna, an AN/ALR-69 radar warning system. There are four of these round antennas on the A-10; one on each side of the nose and two more on each side of the tail. The Avenger cannon is also prominent as its seven barrel Gatling gun muzzle extends forward from its gas seal. (USAF)

A Maryland Air National Guard A-10 launches from a Forward Operating Location (FOL) armed with CBU (Cluster Bomb Unit) ordnance. (R. Drury)

The self-contained boarding ladder is extended and the canopy is raised indicating that an A-10 pilot is not far away. Note his survival vest hanging from the left wing pylon, a quick and convenient "hanger". (R. Drury)



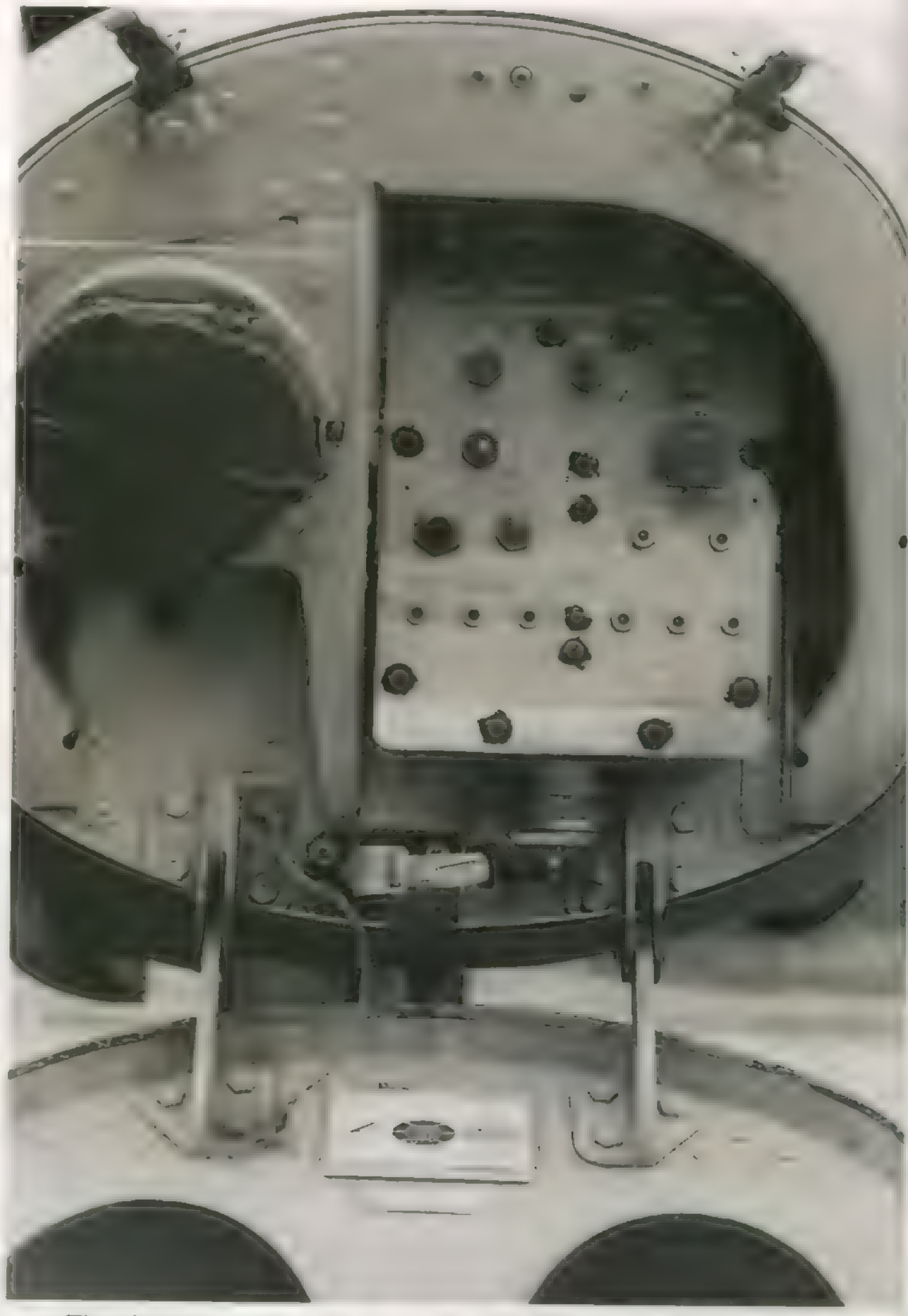
This A-10's gun muzzle has been highly polished giving a bright and shiny exterior to a most deadly weapon. (Tom Howard)

The absolute, no nonsense, business end of the awesome General Electric GAU-8/A, 30mm Avenger armament system. The gun is a Gatling type mechanism and each of the gun's seven barrels fires only once during each revolution of the barrel cluster. Various types of ammunition can be used, such as Target Practice (TP), High Explosive Incendiary (HEI) and Armor Piercing Incendiary (API). The weight of a single cartridge is 1.530 pounds for TP/HEI and 1.65 pounds for API. (R. Drury)

During a quick ground stop, an A-10 pilot has placed his helmet atop the instrument panel and the oxygen hose hangs from the mask. Note the pilot's knee clipboard also stowed aside the panel top. (R. Drury)

A 23rd TFW A-10 pulls "streamers" from its curved wingtips during hard maneuvering on a humid day. (J. Cupido)

A quartering left front view of this Warthog reveals the rounded AN/ALR-69 radar warning receiver (RWR) which is found on each side of the nose and tail. While the ominous muzzle of the Avenger is most prominent, the airframe hides the immensity of the entire mechanism. The assembly is actually nearly 20 feet long. (R. Drury)



The A-10's single point refueling (SPR) area in the tip of the port landing gear pod housing. The actual receptacle is on the left with its cover in place. To its right is the fuel system control panel. The two wing tanks and both fuselage tanks can be refueled from this single position. (R. Drury)

An underside view of the A-10's wingtip chaff/flare dispensers. As a counter to ground radar and heat-seeking missiles, flares and chaff is ejected in order to counter those threats. These dispensers are located under the wingtips as well as the rear ends of the landing gear housings. (R. Drury)

Four Warthogs being refueled from the single point refueling (SPR) receptacle. These aircraft are on a training mission at a Forward Operating Location (FOL) in New York. (R. Drury)

A Maryland Air National Guard A-10 with its refueling door open and boarding ladder extended. (R. Drury)

The A-10's instrument pane basic but efficient. Flight instruments are centered with engine instruments to the right, armament control panel or the left. (R. Drury)

A Baltimore, Maryland 175th TFG A-10 pilot about to board his A-10 at a Forward Operating Location (FOL). Warthog pilots wear a G-suit since low-level maneuvering can be high-G flying much of the time. The A-10 was designed with a 7.3 G structure although lower figures are attained depending on speed and external loads. (R. Drury)

The right console contains a caution light panel to warn the pilot of systems problems, the chaff/ flare controls, a control display unit (CDU), environmental and lighting controls and the canopy controls. (R. Drury)

This A-10 sits in a remote parking spot at a Forward Operating Location (FOL) designed to simulate battfield conditions. The aircraft is loaded with CBU-52 (Cluster Bomb Unit) ordnance. (R. Drury)

The ailerons on the A-10 split to form what are known as "decelerons". These are the airbrakes which also provide roll control. This photo shows the decelerons in the full open position. (R. Drury)

This striking front end aerial view of an A-10 clearly shows the high mounted twin engines with trailing exhaust stream. Mounting the General Electric TF-34-100 turbofan engines high and behind the wings offers excellent foreign object damage (FOD) protection as well as some measure of cover from heat-seeking missiles. (USAF)

The A-10 accepts only the rigid boom type of refueling probe rather than the droge system favored by other countries. The flush fuselage nose refueling door folds down to allow the probe to enter the refueling receptacle (USAF)


This aircraft from the 355th FW at Davis-Monthan AFB, Arizona, is used for A-10 demonstrations. Notice the luggage containers brightly painted. (Tom Howard)

A closeup of the luggage container on a 355th FW aircraft. This unit is called an MXU-648 "aircraft cargo pod" in hardware nomenclature. (Tom Howard)


The 355th FW demonstration aircraft with engine covers in place and luggage containers underwing. Also note the highly polished muzzle of the GAU-8 A Avenger cannon. The A-10 makes an unusual and entertaining airshow aircraft. (Tom Howard)

An A-10 approaches a tanker for aerial refueling during Operation Desert Shield. Note the ordnance load contains Maverick and Sidewinder missiles, the Pave Penny pod and ALQ-119 electronic countermeasures pod. (USAF)

An Air Force A-10 refuels from a KC-10 as part of an Operation Desert Storm mission. The Warthog's ordnance includes the Maverick and Sidewinder missiles and an ALQ-119 electronic countermeasures pod is seen on the right wing outboard station. (USAF)

An A-10 close ground support aircraft from the 23rd TFW, England AFB, LA., is uploaded with 30mm cannon ammo, MK-87 cluster bombs, AGM-65 Maverick missiles and AIM-9 Sidewinder missiles. (USAF)

Captain Jon Engle's A-10. The mounting step inside door art is from a book called BOX SEAT OVER HELL about the "Grasshopper" pilots of WWII. They were the original Forward Air Controllers (FACs) and Captain Engle just happens to own his own 1942 L-4 Grasshopper! Barely noticeable under the pilot and crew chief name block are a group of nails. Each nail stands for 3 combat missions on the aircraft. At the time of this picture it had 54 combat missions. The nail is used since Captain Engle is from the 23rd TASS which used the Nail FAC callsign, as was done during the Southeast Asian war with Nail FACs from Nakhon Phanom, Thailand. Captain Engle's callsign was Nail 33. (J. Engle)

This A-10 was the first Warthog to get an air-to-air kill against a helicopter. This aircraft is number 205 and was flown by Captain Bob Swain, 706th TFS, New Orleans Air National Guard. (J. Engle)

Note the oil residue on Captain Engle's A-10, a product of flying through the smoke of Kuwait after the oil fires were started. (J. Engle)

First Lieutenant "Oly" Olson, OA-10 pilot and winner of the Silver Star. Lt. Olson lost his life attempting to suppress threats for ground units engaged with Iraq's "Elite Republican Guard". (Sgt. A. Stanton)

An A-10 at King Fahd Air Base about 25 miles northwest of Dhahran. It is loaded for a strike and shows 6 MK-82 bombs on the inner pylons as well as a Pave Penny pod. (Sgt. A. Stanton)

Battle damage sustained by a Myrtle Beach A-10. Note the main landing gear pod fairing damage and right wing leading edge destruction, certainly graphic evidence that the triple spar wing is strong, as advertised! (Sgt. A. Stanton)

Further photos of the Myrtle Beach A-10's wing battle damage. The leading edge to the tip has been removed for inspection of the structure, repair and final replacement of the damaged sections. (Captain L. Cook)

The Flying Tigers sign, a tribute to the legacy of men who first flew sharkmouthed P-40s, now handed over to those who fly the A-10 Warthog. (Captain L. Cook)

A fully loaded A-10 from the 23rd TFW sits in it's desert rivetment during Operation Desert Storm. The aircraft was home-based at England AFB, Louisiana (carrying the tail code 'EL') and was allocated to the 76th TFS. (Tom Wakeford and Ian Rentoul)

A 23rd TFW A-10 loaded for a mission with Maverick and Sidewinder missiles. (Captain L. Cook)

An A-10 loaded, in revetment parking, also with Maverick and Sidewinder missiles. (Captain L Cook)


This 23rd TFW A-10 took extensive battle damage to its tail section and proves the Air Force and manufacturer's advertising that an A-10 can lose half its tail and still get home. (Sgt. A. Stanton)

As well as stateside aircraft, A-10s were drawn from USAFE during the Gulf War. This aircraft is from the 511th TFS of the 10th TFW - 'the Vultures'. This aircraft, 'The Fighting Irish,' belongs to the Commander, Col. Mike O'Connor. (Tom Wakeford and Ian Rentoul)

Unsung heroes in any war are the groundcrew who prepare, launch and recover the aircraft. Here, a team covers an aircraft at the end of a days fly-ng In the Gulf, sand ingestion became a problem for a number of aircraft types. (Tom Wakeford and Ian Rentoul)

A destroyed Iraqi tank following an A-10 strike. (Sgt. A. Stanton)

A destroyed ZSU anti-aircraft-artillery (AAA) piece following a meeting with an A-10. (Sgt. A. Stanton)

Destroyed Iraqi armor in Kuwait, presumably the result of an A-10 strike. (Sgt. A. Stanton)

A gathering of Hogs on the runway at King Fahd Air Base, the line on the right belonging to the 23rd TFW. (Sgt. A. Stanton)


Nose art became important on aircraft during Operation Desert Storm and many well known characters were used, including 'Oddie' from the Garfield comic strip dispensing a Maverick missile. (Tom Wakeford and Ian Rentoul)

An interesting rearview photo of an OA-10 pilot in the cockpit with canopy still raised, about to launch from King Fahd Air Base. (Sgt. A. Stanton)


Nose art on A-10 81-0967 from the 10th Tactical Fighter Wing, RAF Alconbury England in 1991. (Tom Wakeford and Ian Rentoul)


Nose art on A-10 81-0947 from the 10th Tactical Fighter Wing, RAF Alconbury England in 1991. (Tom Wakeford and Ian Rentoul)

A pair of A-10 close ground support aircraft from the 23rd TFW, England AFB, LA., is seen taxiing prior to take off. (USAF)

A-10s of the Battle Creek, Michigan ANG unit, the 172nd FS. This unit transitioned from the A-37 to the A-10 in May of 1991. (MSG Jeff Rohloff/USAF)

Most Battle Creek A-10s came from the Alaskan Air Command's 18th TFS, the only Alaskan Air Command A-10 squadron based at Eileson AFB near Fairbanks, Alaska. (MSG Jeff Rohloff/USAF)

This 172nd FS A-10 carries the TGM-65 (Training Guided Missile) practice Maverick missiles which have no motor but allow the pilot to practice with the scope only. (MSG Jeff Rohloff/USAF)

172nd FS A-10s air refuel from a KC-135 of the 128th WI ANG in July of 1992. (MSG Jeff Rohloff/USAF)

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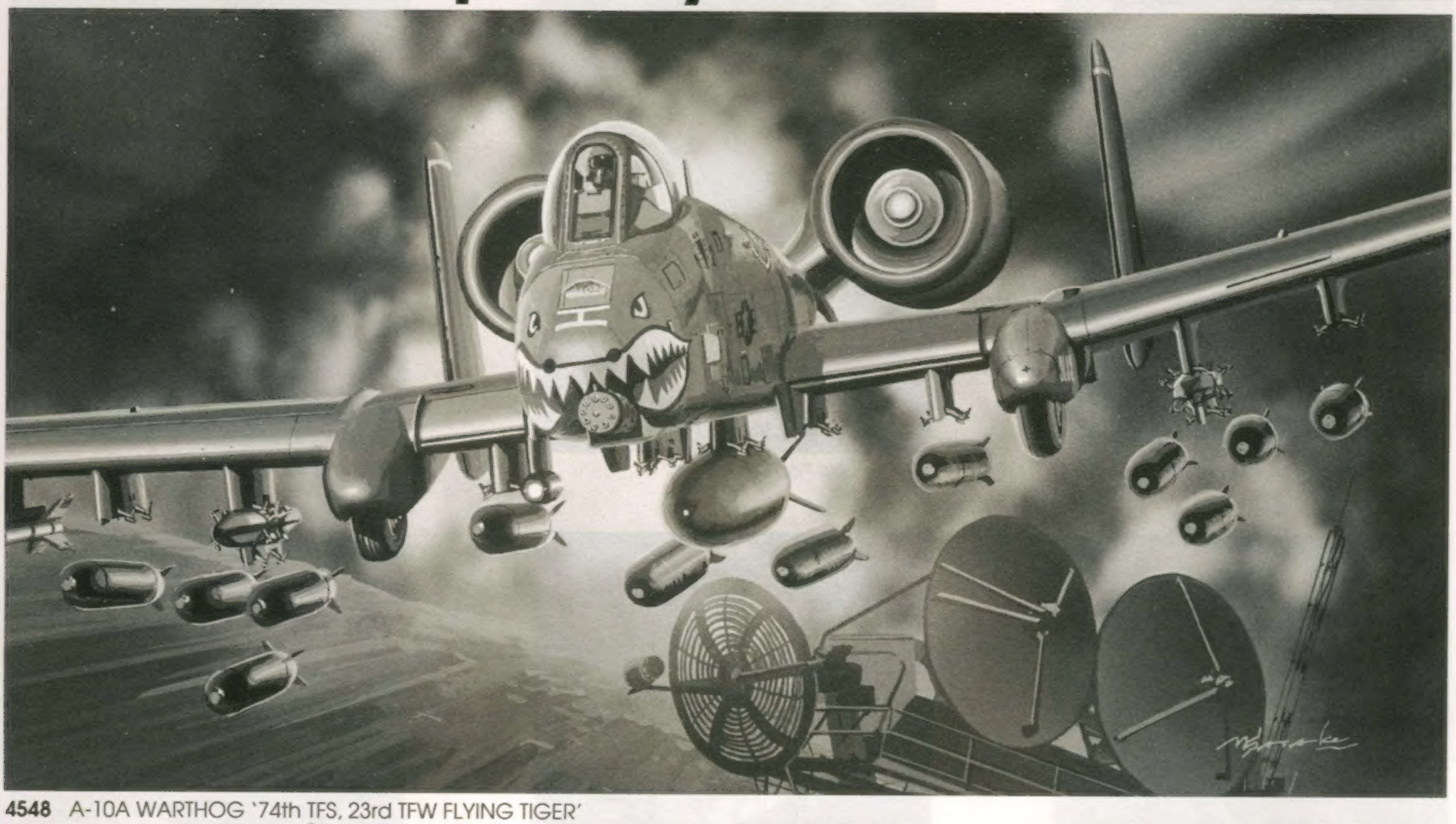

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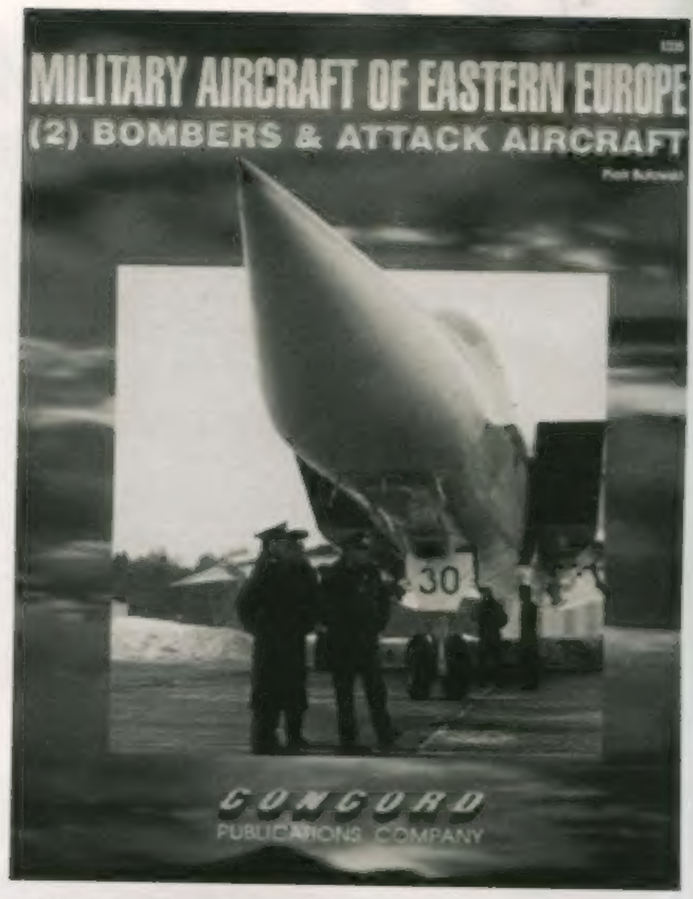


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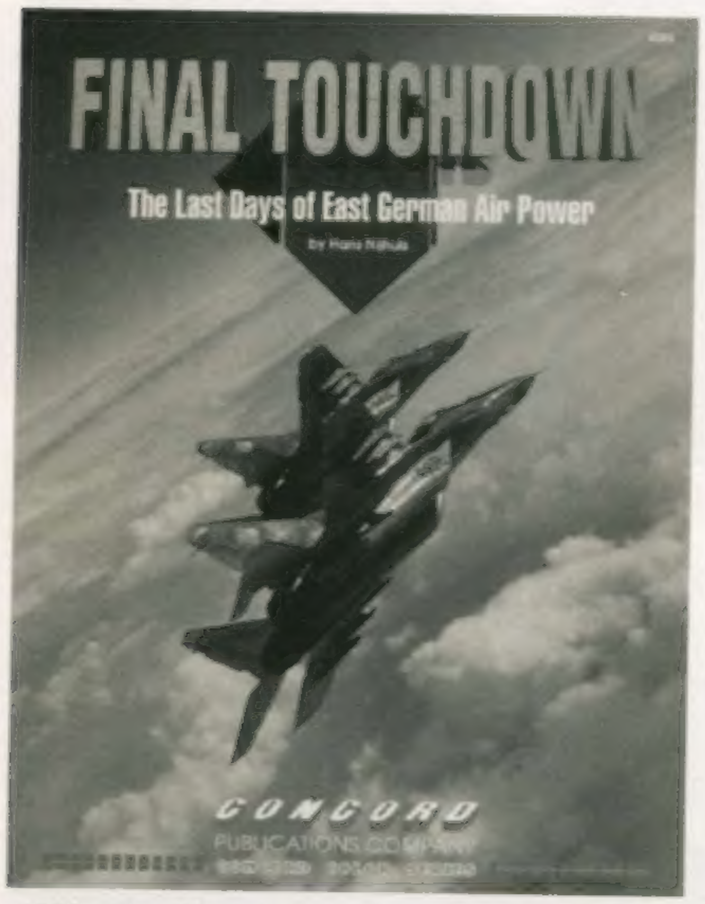


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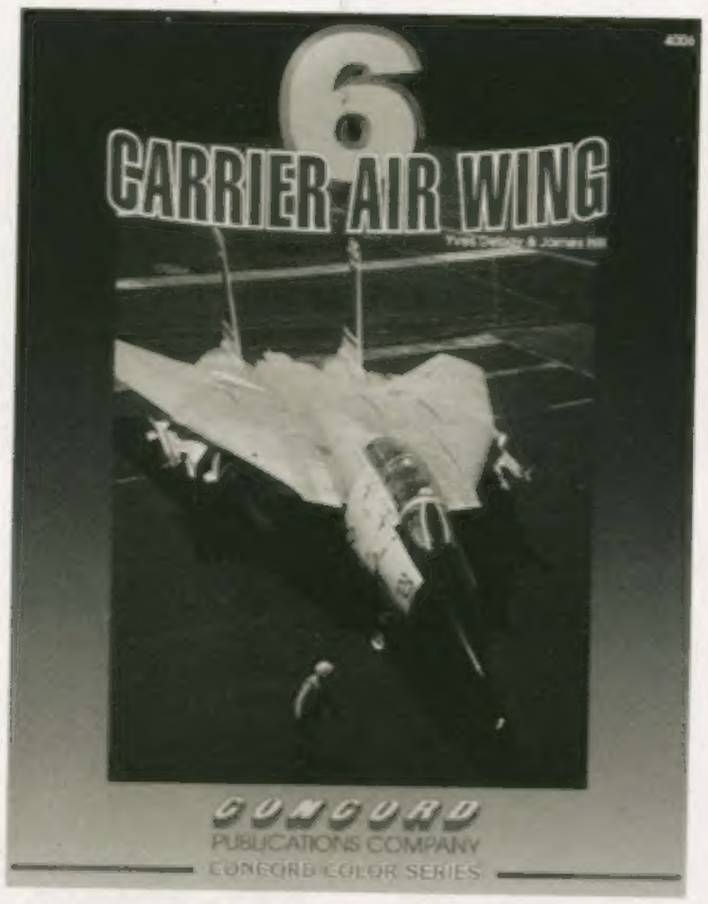


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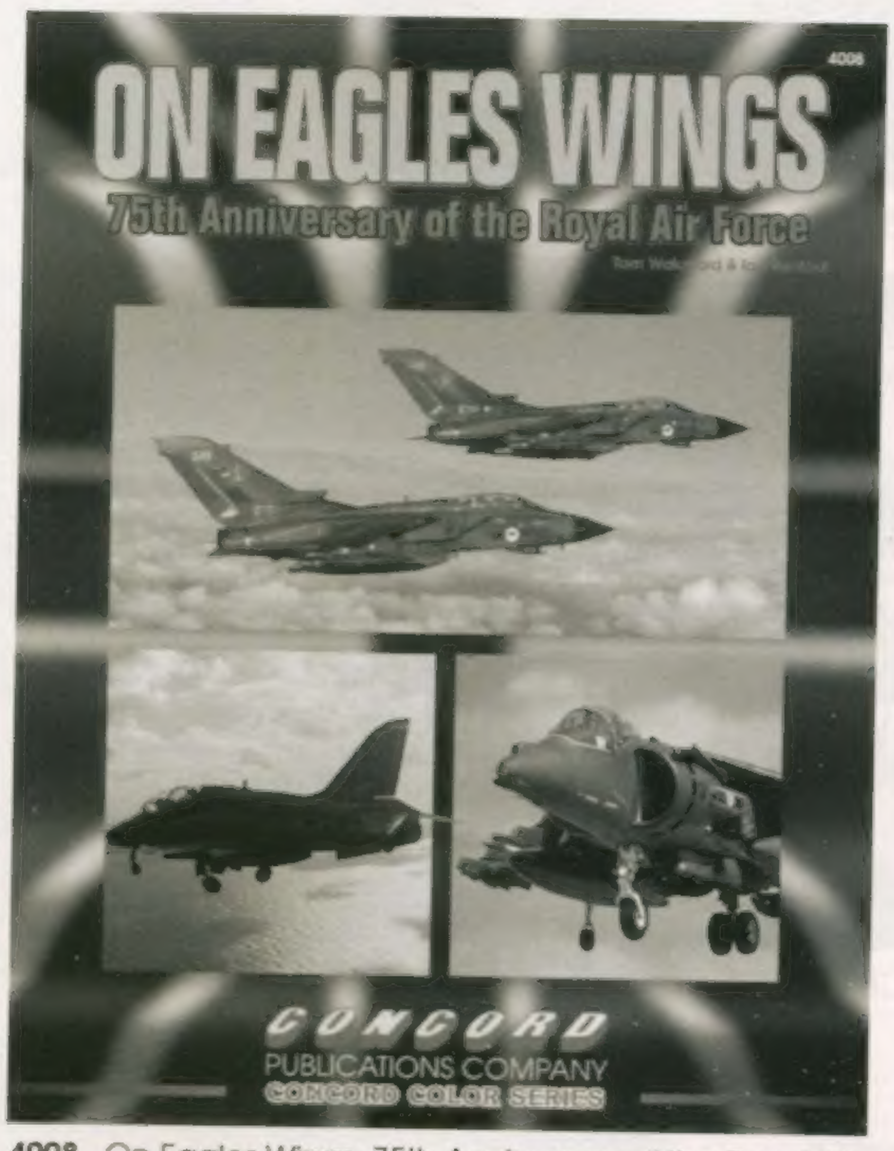


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